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ABSTRACT

Population dynamics, broadly defined, can be effectively taught in an interdisciplinary fashion. This course for junior and senior undergraduates is taught by an anthropologist, biologist, demographer, economist, and geographer. It is 75 percent lecture, 25 percent panel discussion with film presentations and has been used successfully as an NSF funded summer institute for teachers. The course content is divided into three areas: first, human evolution and its corresponding cultural and demographic factors; second, man's existence in relation to environmental factors and economic considerations; third, political activities and practical methods for limiting population, including moral and ethical considerations. Educators in population should realize that they are committed to changing values as well as clarifying them. The incorporation of population education in our schools is a particular goal for that reason. Process education which emphasizes "doing" to promote "understanding" is another important concept for furthering the population educationist's goals. (JH)

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An Interdisciplinary Approach to Population Dynamics

"The essence of wisdom is emancipation, as far as possible,
from the tyranny of the here and now."

Bertrand Russell on "Knowledge and Wisdom"

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My central themes in this paper will be that population education should be very broadly defined, that it goes substantially beyond the presentation of demographic data, that it may be developed utilizing any one of the several underlying conceptual frameworks (only one of which is represented by the interdisciplinary approach presented here), that we are in the business of trying to change values as well as clarifying them, and that this should be approached openly, that one of our major goals is to "institutionalize" population education, and finally, that one of our exciting challenges is to infuse "process education" into our approaches to pop ed. The paper will attempt to develop these points within the constraints of its title, and will try to minimize the obvious overlap with other papers presented today in our session.

Those of us at the University of Cincinnati involved in population education have accepted its definition as given by the Population Reference Bureau in 1970:

"Population education seeks to bring about a realization of the individual, family, social and environmental effects of the explosive increase in human population, the rapid shifts in the concentration and distribution of people, the implications of changing age and other demographic patterns, and the conceivable options that may be open to mankind to cope with the consequent problems."¹

This seems to us a properly broad definition of population education, and in my judgment, does not deviate significantly from other definition I have seen or heard, e.g., the definition and goals expressed by Steve Viederman in the Population Commission Report (2). It clearly allows for full exploration of the causes, processes, and ramifications of both population growth and distribution, as well as in depth discussions of attitudes and values. Hopefully, we all agree that these are the components of any properly balanced population education program.

I find that the presentation of a demography course on a college campus, the infusion of a heavier emphasis on population processes into high school American History, or

¹"Population Education: A Challenge of the Seventies", Population Bulletin, Vol. XXVI, No. 3, Population Reference Bureau, Inc., September, 1970.

²Population and the American Future, The Report of the Commission on Population Growth and the American Future, Chapter 9, 1972.

discussing natural population dynamics as part of biological ecology are all perfectly valid components of population education, but that we must strive for considerably more if we are to attain holistic meaning and understanding.

This is essentially what I believe most of us in the pop ed field are trying to accomplish; thus, the real questions arise when the constraints of time and available expertise are taken into account. Because these vary enormously, there is surely no one methodology or approach which is more effective than any others, except in the light of each specific educational circumstance. This is simply a pragmatic view of taking individuals and school systems "where they're at". Each local setting is somewhere along the continuous spectrum of readiness for achieving this holistic understanding, and we need to begin wherever that might be in each particular instance. I believe that the interdisciplinary approach is closer to the right end of the spectrum, but it may be that in most circumstances, it is not the best approach to use. What the rest of this paper is meant to do is describe where we have gone using this approach, how it might be more generally utilized, and what new directions we at U.C. would like to try.

The interdisciplinary approach to population education at the University of Cincinnati is presented by a team of

five faculty consisting of an Anthropologist, Biologist, Demographer, Economist, and Geographer. It is described as inter- rather than multi- disciplinary, because I believe that after three years of effort, we had had sufficient communication and dialogue to allow for an integrated set of presentations, in contrast to a series of independent guest lectures from the several disciplines. This endeavor has taken considerable time of the faculty involved, and I hasten to state that we are a considerable distance away from perfection. However, for those of us who feel there are distinctions to be made between the inter- and multi- discipline approaches, I feel we have turned the corner, even though I would find it difficult to articulate precisely where the "corner" is.

The course is presented during the academic year without prerequisites for any university junior or senior as one quarter of a year long Man and Environment sequence. Essentially the same content has been presented to secondary school teachers through a six week's summer institute sponsored by the National Science Foundation, and will be given again for the third time this coming summer.

The underlying theme or conceptual framework of this approach is how man's population growth and distribution

relate to his biological and cultural evolution. Most, if not all, populations of plants and animals have evolved not only wondrous means of dispersal, but also intricate and marvelous mechanisms to insure both an enormous reproductive potential and at the same time a means of regulating their own population size. Organismic populations under natural conditions do not maintain continued population growth for any extended period of time, but rather reach a stable or dynamic equilibrium with the carrying capacity of their environment. Man must also adhere to this biological rule, even though his cultural evolution has allowed the carrying capacity of his environment to be increased enormously.

The course is divided into three sections of approximately equal length. Section I (Historical, Cultural, and Current Demography) is an historical consideration of human evolution from primitive man to the present regarding population size, distribution, migration, growth rates and accompanying cultural perspectives of these factors, and emphasizes current demographic statistics of various countries, with particular accent on the U.S.. Section II (Determinants of How Many People the Earth Can Support) considers the relationship between population growth and ecological principles, incorporating man's impact on natural

resources and the balance of major ecosystems, his capacity to increase food and energy production, the urban environment's impact on the health of man, relationships between DC's and UDC's, and the economic realities of these complex interactions. Section III (Some Approaches to Self-Regulation) includes current political activities associated with controlling population growth (and distribution), current methods of fertility control available, their advantages and disadvantages, and the moral and ethical judgments associated with population control.

I would like to elaborate a bit further on each of these sections to convey how we attempt to integrate both the faculty involved, and their subject matter. Our anthropologist begins the course by discussing the basic principles of biological and cultural evolution, population size, growth rates and distribution from Australopithecus to modern Homo sapiens, historical and current natural checks on both human and non-human populations, and some specific regulation mechanisms on primitive man, including the possible role of systematic infanticide in human evolution and population limitation. Both physical and cultural anthropological factors are discussed, including ethnographic analogy, technological resources of early races, and estimated population densities. The population

explosion in human numbers over the past few hundred years is presented as a fact, but not as a crisis. A film entitled The Time of Man released by the American Museum of Natural History in 1971 is shown, and encases beautifully our early emphasis. Some of you may be aware of this film, which I believe is one of the truly exceptional films on population and environment available.

Our geographer continues from this setting by discussing world wide physical and climatic factors, how and why people are currently distributed as they are, and migration and urbanization patterns within the U.S. This leads into a week's discussion of basic demography^{ic} principles by our demographer, including population age/sex structures, fertility, mortality and migration rates, theories of population growth, common demographic terminology, and current U.S. and world statistics.

Section II speaks to the questions of quality vs. quantity, and how many people the earth might support. It does not attempt to answer the question "What is the optimum level of population size?", but rather, ~~tries~~ to clarify what are the constraints of the finite earth, and what other factors are involved in formulating an answer to this question. Thus, the finite resources of the earth are discussed, including water, non-renewable mineral resources, and fossil fuels, from the geographer's point of view. Here we develop conflicting

conclusions between faculty, as the economist's viewpoint differs rather substantially from that of the geographer's. The economist's position rests heavily on having large amounts of low cost energy available to develop further technologies and resources, so an energy expert is invited in to discuss potential sources of energy, i.e., fission and fusion nuclear reactors, hydropower, fossil fuel reserves, and geothermal and solar sources. The economist then develops a rather optimistic view (in contrast to the geographer) of what the future might hold in terms of improved technologies, new resources, and cleaning up pollution and environmental deterioration using the capitalist system, the law of supply and demand, and other economic principles. This discussion is extended from the U.S. to the international scene and the development of underdeveloped countries, and here in presenting the relationships between DC and UDC's, our economist is less sanguine.

Current and future potentials in food production, as a vital component of renewable resources^{are}, is also presented in this section. Through discussion of such topics as farming the sea, building upon the green revolution,^{and} the effect of modern agriculture, ecological principles, balance and perturbations of ecosystems, and dynamics of natural populations are presented. The attempt is to put the

discussions of this section into an understanding of ecological relationships, and that man is not excused from the laws of ecosystems dynamics.

The final section of the course discusses current attempts at self regulation within the U.S. This includes the results of the National Fertility Studies, discussion of fertility control as a motivational and/or technical problem, the 20th century birth control movement, specifics of currently available methods of fertility control, the need for population education, and the political activities of the last several years on the national level, e.g., the Tydings Act, report of the Population Commission, and national organizations involved in population activities. Some of those involved in national population politics are invited in to give these presentations.

While the majority of the course is lecture from the faculty team and outside guests, approximately 25% is devoted to both panel discussions (students and faculty) and films. For example, at the end of each section, the faculty who have lectured return for one period of dialogue and debate. The students consistently respond well to the films and discussions, but an attempt at increasing this percentage has not been considered beneficial to the overall presentation.

I have of course given only a superficial view of the interdisciplinary approach we take, but I hope it has been sufficient to allow you to taste its flavor. There are clearly numerous valid aspects of pop ed which we do not include; hopefully, a dialogue will develop shortly on the general framework we use, its missing parts, and the relative emphasis we give particular topics through time allotments. However, for us it most closely approaches the holistic view which we deem to be so important in developing both a broad understanding of pop ed, and the excitement of population dynamics in general. The approach is not unique, at least to the extent several authors such as Fred Singer, Shirley Martley, Paul Ehrlich, and Susan Reid (3) have developed it to varying degrees in their books. In fact, some of you may feel you come close to this breadth of coverage in your individual courses, which, if true, puts us in agreement on the basic framework. In our particular case however, none

³Singer, Fred. (Ed.) 1971. Is There an Optimum Level of Population? McGraw-Hill Press.

Hartley, Shirley Foster. 1972. Population Quantity vs. Quality. Prentice-Hall, Inc.

Ehrlich, Paul R. and Ehrlich Anne H. 1972. Population, Resources, Environment. W.H. Freeman and Company.

Reid, Sue T. and Lyon, David L. 1972. Population Crisis; An Interdisciplinary Perspective. Scott, Foresman and Company.

of us have felt qualified as an individual to present this diversity of topics. A more important point is that the students tell us the diversity of faculty, and differing views they present, are the greatest strengths of the course. The disagreements between faculty, and the dialogues during discussion periods when several faculty are present, allow us to present a more balanced set of views, and is more representative of the differing views currently in existence on a number of the important topics. Thus, it significantly eliminates the narrowness of understanding and interpretation which would occur if any one of us was the only lecturer. It also decreases the "humdrum" of having to listen to any one of us for the entire quarter, a point not lightly dismissed by a number of students.

There are three final points which I would like to briefly develop. The first is that this broad perspective is not only of value to the general undergraduate student who may or may not be pursuing population dynamics in greater depth as part of his university studies, but it has worked extremely well to date with the secondary school teachers in the NSF summer institute. Here we accept a diversity of teachers from the social sciences, general sciences, biology, health, and those who teach or are planning to teach interdisciplinary courses. For six

weeks, these teachers not only broaden their discipline orientation because of our presentations, but also because the nature of the institute has allowed them to interact on a common topic with peers from very different backgrounds and orientations. For many of them, they discover new ways to break down the traditional discipline barriers which they have been helping to create. Some go back and present workshops for many of the teachers within their school; others begin guest lecturing in courses outside their ~~own~~ discipline; still others develop three, six, or nine week interdisciplinary courses on population dynamics using most of the material presented in the institute. Of course, a number of them infuse the material into their basic discipline courses and programs, which is also a perfectly acceptable form of population education implementation. If we can continue to develop both pop ed curriculum materials, and teacher training programs, we will be well on our way toward institutionalizing pop ed in a variety of frameworks within the formal educational system.

The second point concerns our approaches ^{as population educators} toward attitudes and values. I believe we are being dishonest if we say our goal is only to clarify values, and that we in addition are not trying to change them. I think this is particularly true if we look at the overall context of

man and his relationship to the environment, which I have suggested is a vital underlying theme of pop ed. Environmental educators are unabashed in their attempts to change values and attitudes toward pollution, environmental degradation, and resource depletion, and I feel we too in pop ed should not apologize for attempting to create a new population and environmental ethic. This can be carried out in an open atmosphere where all attitudes are accepted as valid. We as the teachers can clearly and openly state our own value judgments on a particular topic, and then proceed to present material without an attempt to indoctrinate or propagandize. Stating our own position and viewpoint may help to determine those of the students without denying the students' right of free choice.

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In reality, I believe that teaching and determining values for students has long been a major component of our educational system. As a guide to reality about current teaching practices, it is useful to point out the results of a relatively recent survey which was designed to test the ability of high school teachers in determining whether a statement is based on fact or on opinion. Forty-two percent of the teachers in the sample indicated that the following statement was a fact: "The American form of government may not be perfect, but it is the best type of

government yet devised by man."⁴

The final point I wish to make concerns the need for a greater emphasis on "process education" in pop ed. Possibly this reflects only the approach I have presented here, and not pop ed in general, but we feel more confident about content than about process. We at U.C. plan to spend more time in at least testing the hypothesis embodied in the following Chinese proverb:

I hear, and I forget
I see, and I remember
I do, and I understand

One of our activities during the summer institute program has been to take the participants to the cemetery for the purpose of collecting headstone data. Given a reasonably old cemetery, a randomization scheme for determining which headstones to include, and some enthusiastic man and women power, data can be collected which will generate a graph similar to that shown in figure 1. The hypothesis being tested is that there is no difference in infant mortality for those buried throughout the years of existence of the cemetery, and it is an hypothesis the data obviously do not support. This activity is an excellent example of how students

⁴Zeigler, Harmon. The Political World of the High School Teacher, Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1966, pp. 130-131.

can become actively involved in using the scientific method, and at the same time considerably aiding their understanding of one of the important components of modern demography.

It is this type of process education which we in Cincinnati want to help nurture and see greatly expanded. Only by attempting to do this will we know whether process education has been one of our vital missing components.

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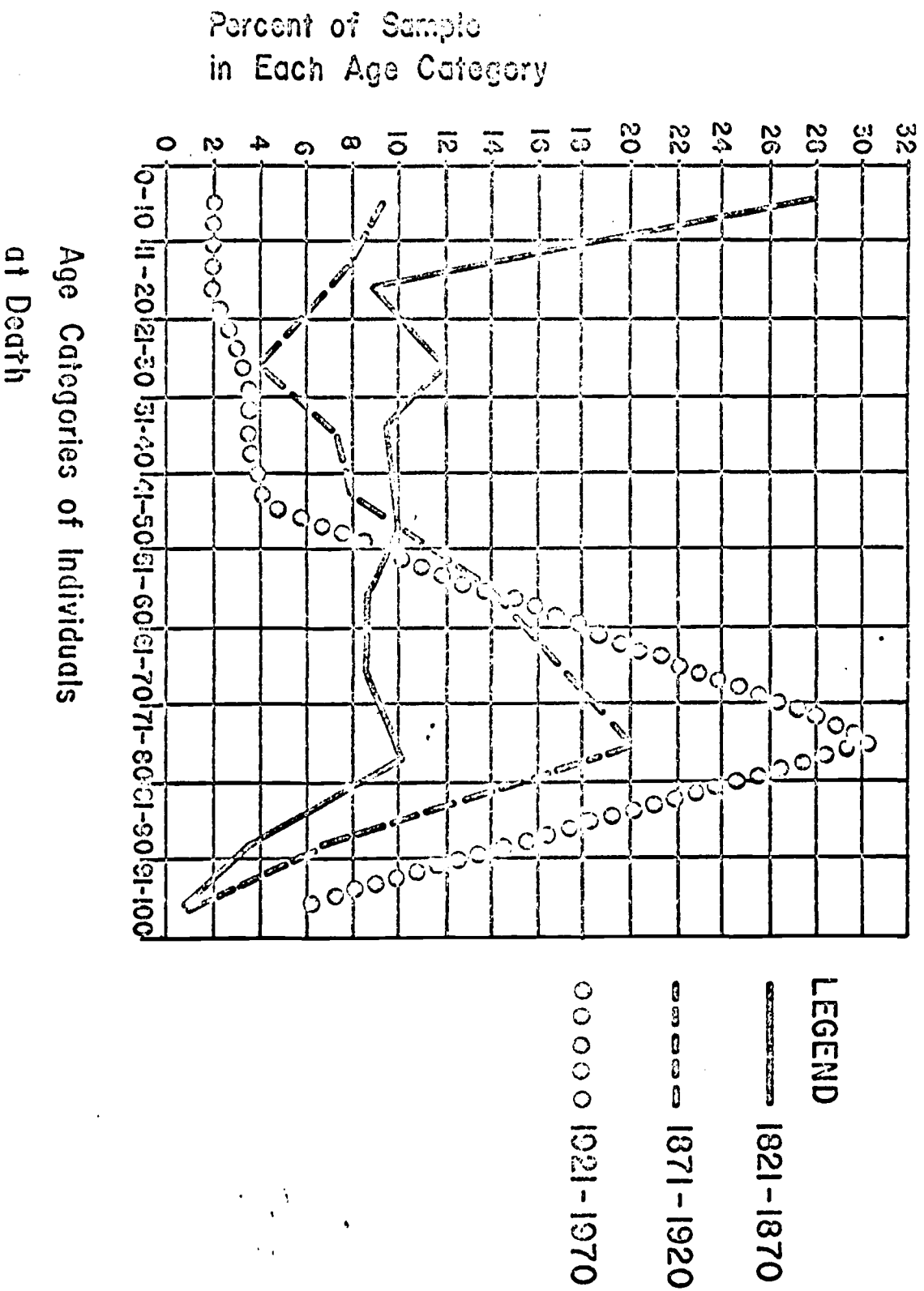


FIGURE 1.